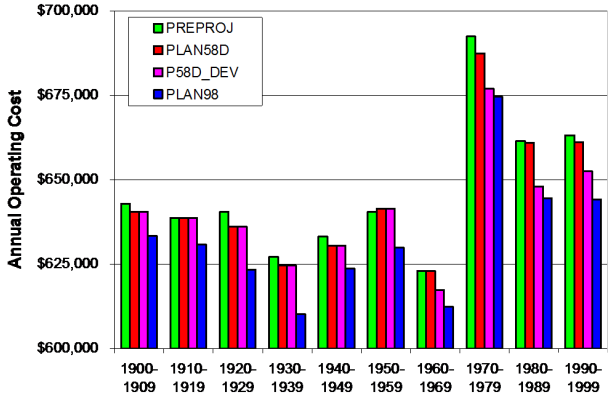
PROJECT St. Lawrence River Erosion



CLIENT
Environment Canada
Sainte-Foy, QC

LOCATION
St. Lawrence River, ON-QC

DATE
2001-2005

PROJECT DESCRIPTION
The International Joint Commission (IJC) undertook a multi-year study to develop a new discharge regulation plan for the Moses-Saunders Generating Station, which controls flows and levels in Lake Ontario and the St. Lawrence River. Under contract to Environment Canada, Coldwater Consulting Ltd. was responsible for developing and applying analysis techniques for the shorelines of the lower St. Lawrence River.

DESIGN APPROACH
Because a flow regulation plan has a direct effect on the flows and an indirect effect on the shoreline, a variety of physical processes had to be modelled, ranging from hydrodynamics, such as river flows, wind waves, ship waves, to morphological processes, such as erosion and desiccation. In order to undertake the study, Coldwater developed a number of numerical models, each designed, constructed and applied according to its suitability, accuracy and efficiency.

Coldwater employed an indicator-site methodology, in which the response of the shore to various regulation plans was assessed at a number of geographically-distributed locations throughout the region. Detailed, process-based modelling was performed at each indicator site using the Cohesive Profile Evolution model (CPE). This model computed the cross-shore response of a cohesive profile to the combined actions of currents, wind waves and ship wakes on an hour-by-hour basis for selected sites on the river. The CPE model was calibrated and validated using field measurements and a detailed database of shore recession.

Because of the huge scope of the study, which examined the impacts of a number of regulation plans over a 101-year time-frame on a domain exceeding 600 km, two parametric models, the Riverbank Response Model (RRM) and the Structural Response Model (SRM), were also developed and applied. These highly efficient models used a stochastic methodology to emulate the results of the CPE.

The RRM and SRM model results were evaluated in terms of shore recession and land loss, impacts on structures, turbidity and loss of habitat and nesting sites. Both models were incorporated into the IJC's Shared Vision Model (SVM) for the study.

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